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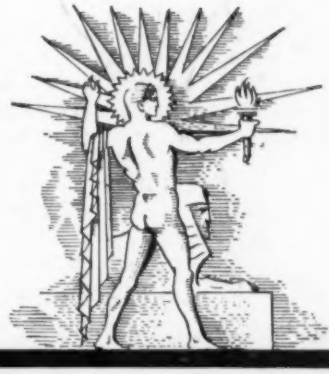
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



May 10, 1941

For Big Wind

See Page 297

A SCIENCE SERVICE PUBLICATION

Do You Know?

Shells of most mollusks have three layers.

About 80% of Yugoslavia's people normally are engaged in *farming*.

A new industry in Finland is producing prefabricated wooden *houses*.

It is thought likely that *sardines* and *herrings* are the ocean's most numerous fish.

Reports from colonial days tell of New England *lobsters* measuring two feet from head to tail.

In China 2,000 years ago importance of a state was sometimes expressed in terms of the number of *chariots* it could muster.

One automobile manufacturer foresees that *plastic fenders* should absorb a blow ten times greater than steel without denting.

Waging air war on *grasshoppers*, Federal scientists are testing poison bait mixed with oil instead of water—as a weight saving device.

A new *9-lens camera* for American patrol bombing planes is designed to scout for enemy gun emplacements, barge collections, or concentrations of troops.

A scientist says that Great Britain could meet 7% of its peace-time petroleum needs by using as a substitute *methane gas* recovered from coal mines, oil borings, and sewage.

New *airline* service brings Fairbanks, Alaska, within two days' journey from New York.

A possible substitute for Chinese tung oil is *kukui* oil, extracted from a nut growing in Hawaii.

The German government, by one estimate, is spending about 28 billion dollars a year—72% of the national income—on *war*.

One severe storm last November caused turkey growers in this country to lose more than a millon *turkeys*.

If needed at any cost, *tin* could be recovered from America's used cans—as much as 12,000 tons a year.

Hunter College, New York, is giving an evening course in *cryptography*, for study of secret writing, codes, and ciphers.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

ARCHAEOLOGY

Where is search being made for the very first families of Virginia? p. 302.

ASTRONOMY

How are the Cepheid variable stars now explained? p. 301.

How often does a star in the Milky Way explode? p. 299.

What causes the green line in the spectrum of the corona which has been attributed to "coronium"? p. 291.

BIOLOGY

What test distinguishes between cancer and normal cells? p. 292.

BOTANY

What is the original home of the watermelon? p. 296.

CHEMISTRY

What was the original use for Roman candles? p. 297.

ETHNOLOGY

How do the Hopi Indians safeguard themselves during snake dance? p. 297.

GENERAL SCIENCE

How will the new National Science Fund be administered? p. 295.

GEOPHYSICS

How can an ordinary hypodermic syringe be used to measure the water vapor in the air? p. 294.

How can scientists measure the speed with which the core of the earth turns? p. 294.

When should you watch for northern lights? p. 294.

MEDICINE

How can premature change of life be prevented? p. 296.

How has the earth itself provided a cure for dangerous germ infections? p. 292.

How many new physicians graduate from medical school each year? p. 296.

What body changes are caused by dilantin, epilepsy remedy? p. 296.

What new gold compound may result in a better treatment of rheumatism? p. 298.

METALLURGY

What new process may aid in production of magnesium? p. 302.

ORNITHOLOGY

How many birds are there in the United States? p. 303.

PHYSIOLOGY

What common seasoning prevents deterioration of the pituitary gland? p. 296.

What would a baby born without thyroid tissue look like? p. 297.

PSYCHOLOGY

What need in man is overlooked by propagandists? p. 298.

RADIO

How fast do radio waves travel? p. 295.

SCIENCE NEWS LETTER

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ASTRONOMY

Puzzle of Sun's Coronal Halo Solved by New Swedish Theory

Green Line in Spectrum, Thought Due to Coronium, Ascribed to Atoms Broken by Powerful Excitation

ASTRONOMERS are excited by news from Sweden that one of their colleagues, Dr. Bengt Edlen, has found a satisfactory solution for the problem of "coronium"—which they once thought was an unknown element causing a strange green line in the spectrum of the sun's outer shell, its corona.

Dr. Edlen ascribes this and other mysterious lines to broken atoms, with many more electrons removed from their shells than anyone has supposed up to now. His researches indicate that there is some yet unidentified but powerful excitation from the sun that breaks these atoms. They also indicate that the sun is sending to the earth very short ultraviolet rays, which possibly play a part in producing the ionized layers of our atmosphere and make long distance radio possible.

Dr. Polydore Swings, Belgian astronomer now on the staff of the Yerkes Observatory, Williams Bay, Wis., has just made known the research. He describes it as "most certainly the most brilliant attack ever made upon the problem of the line spectrum of the solar corona."

Dr. Swings was associated with Dr. Edlen in previous researches and spent some time discussing this with him in the summer of 1939.

The line spectrum of the corona has been observed for about seventy years at the times of total solar eclipses, and, in recent years, with an instrument called the coronagraph. This spectrum, produced by passing the coronal light through a prism, or reflecting it from a grating ruled with thousands of lines to the inch, shows more than twenty lines, some quite conspicuous.

Most prominent is a green line. There are also two red ones, two in the infrared and one in the ultraviolet. The last three are not visible, but can be photographed. Many previous suggestions have been made to explain them, but these have been unsuccessful.

Dr. Edlen proposes that they are so-called "forbidden" lines, that is, due to atomic changes which cannot take place under ordinary circumstances. However, such changes do occur in the great gaseous nebulae in the sky. As a result of laboratory tests, he concludes that the atoms in the corona are much more highly ionized than has previously been considered. That is, more of the electrons which revolve around in them, like the planets in the solar system, have been removed. The green line, he suggests, is caused by iron atoms thirteen times ionized. By some as yet unexplained excitation, thirteen of the electrons are removed from the iron atom.

The next three strongest lines, the two in the infra-red and the one in the ultraviolet, he ascribes to iron atoms from which twelve electrons have been removed. Weaker lines are caused by nine and ten times ionized iron, while eleven and twelve times ionized calcium and eleven, twelve, fourteen and fifteen times ionized nickel account for others.

"The general result," said Dr. Swings, "points to a maximum abundance for ions with ionization energy of about 400 volts and the source of such a tremendous excitation is very puzzling. Edlen concludes that 97 per cent of the coronal line emission is now explained and that the coronal matter has a chemical composition similar to the average composition of the meteorites; this suggests a possible origin for the coronal matter."

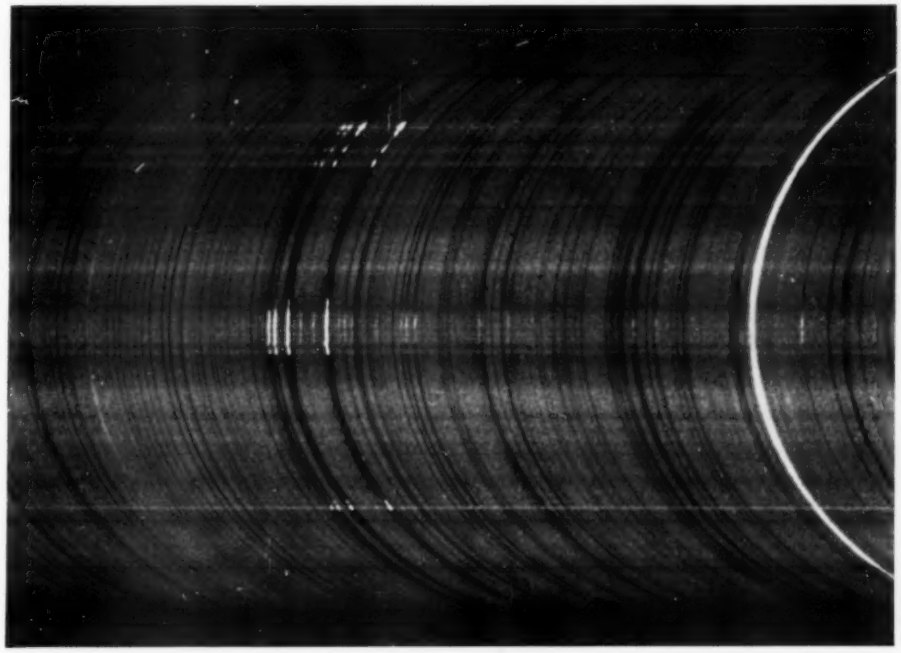
Science News Letter, May 10, 1941

"Quite Convincing"

DR. Edlen's theory of the probable cause of the lines in the spectrum of the sun's corona is "quite convincing," declared a scientist who has worked in the same field. He is Dr. Joseph C. Boyce, assistant professor of physics at Massachusetts Institute of Technology.

In a statement prepared for Science Service he said:

"Edlen's proposed identification of the lines of the solar corona is extremely interesting. Starting from a suggestion made by Grotrian two years ago for two coronal lines, Edlen has now identified thirteen more lines including all of the important lines in this hitherto mysterious spectrum. The many previous proposed solutions of this problem have all turned out to be wrong, but none of



GREEN MYSTERY

The green line in the corona spectrum is the prominent white arc to the right, shown in this photograph made, without an eclipse, by Dr. Bernard Lyot, from the Pic du Midi in France.

them involved as large a fraction of the observed lines. The more lines of a spectrum that are identified, the less likely it is to be due to chance coincidence.

"All of Edlen's previous work in spectroscopy has been of the highest quality and the present proposal shows all the signs of his usual careful work. From the point of view of a physicist working in spectroscopy rather than an astronomer, the present proposals appear quite convincing. They do raise a number of problems for astronomers and for radio engineers. The energies involved in the excitation of these coronal lines now turn out to be far higher than had previously been considered. Also it must now be supposed that ultraviolet light of still shorter wave length must fall on the upper part of the earth's atmosphere.

"This may well play a part in the formation of some of the ionized layers which are involved in the transmission of radio waves around the curved surface of the earth. It is hoped that investigators will soon find additional evidence on either of these points, so as to confirm Edlen's identifications. The outstanding problem of astronomical spectroscopy can then be considered as solved."

Science News Letter, May 10, 1941

BIOLOGY

Centrifuge Distinguishes Cancer Cells from Normal

A NEW and sensitive test to show the difference between normal and cancer cells was described before the meeting of the American Association of Anatomists by Prof. M. F. Guyer and Dr. P. E. Claus of the University of Wisconsin.

The cancer cells examined were from tumors artificially induced in rats by the feeding of a cancer-causing chemical known as butter yellow. (Butter yellow, incidentally, is not found in butter; the name was applied to the chemical because of its color only, and before its cancer-causing proclivities became known.) They were compared with healthy cells from the same animals.

Tests were made by whirling numbers of cells, both healthy and cancerous in all stages of development, in a high-speed centrifuge. The contents of healthy cells proved sufficiently fluid to permit their separation and arrangement into strata, or layers, under the powerful centrifugal force. Cancerous cells whirled at the same speeds failed to stratify, indicating that their contents are more viscous, or "thicker," than those of normal cells.

Science News Letter, May 10, 1941

MEDICINE

Germ-Killing Chemical From Soil Bacteria Cures Humans

Brings Swift Recoveries From Virulent Infections In First Trials; Most Effective Germicide Yet Known

A CHEMICAL from the earth itself, most powerful germ killer yet discovered, better even than the sulfa drugs themselves, has cured in remarkably short time an array of difficult and dangerous human ills, doctors from the Mayo Clinic and the Massachusetts Memorial Hospitals announced to the American Society for Clinical Investigation in Atlantic City.

The new wonder chemical is gramicidin. It is produced by bacteria that live in the soil. The discovery of this chemical was announced to the scientific world in 1939 by Dr. René J. Dubos of the Rockefeller Institute for Medical Research, but these reports are the first on the use of gramicidin in humans.

Empyema from penumonia, sinusitis, bladder infections and dangerous and hard-to-cure staphylococcus infections in wounds are the conditions this new chemical remedy cured in very short time.

Infected wounds were freed of all bacteria within 24 hours after gramicidin treatment, following which the wounds rapidly healed, Dr. Charles H. Rammelkamp and Dr. Chester S. Keefer, of Boston, reported.

"This is a distinct advance inasmuch as former antiseptics would not rid the wound of bacteria without seriously damaging the tissues," Dr. Rammelkamp pointed out.

Sinus infections were cleared up within 48 hours, Dr. Wallace E. Herrell and Dr. Dorothy Heilman, of the Mayo Clinic, reported. Severe bladder infections which the sulfa drugs do not affect were cured within one week.

Gramicidin is the most highly effective agent yet discovered for stopping the growth of bacteria, Dr. Herrell declared.

Trials on 12 patients at the Mayo Clinic were reported in detail, although three more have also benefited.

It has one disadvantage. It breaks down red blood cells by the process called hemolysis. This toxic property of the new chemical remedy was discovered by the Mayo Clinic scientists in experiments with the chemical on pieces of tissue growing outside the human body. These scientists also found a way to prevent this red blood cell-destroying action. This can be accomplished by heating the gramicidin. The heating, however, reduces its effect on the germs.

Gramicidin, therefore, cannot be used, unless heat-treated, where it will come in contact with the blood. This means it is not suitable for injection into the veins. It can, however, be safely injected into such cavities as the sinuses, the bladder, and infected but not bleeding wounds and any local infections such as ulcers.

White blood cells, which are part of the body's defense against germs, are not harmed by gramicidin.

The tremendous potency of gramicidin is shown by the fact that one gamma, or one-thousandth of a milligram, of the substance will stop the growth of virulent streptococcus and pneumonia germs in tissues. One milligram is the equivalent of slightly more than one-hundredth of a grain. Strongest concentration used in treating patients at the Mayo Clinic was 400 gamma per cubic centimeter.

Science News Letter, May 10, 1941

ACADEMY MEETS

Distinguished scientists gathered in Washington last week for the annual spring meeting of the National Academy of Sciences. Photographed in informal discussion between sessions by Fremont Davis, Science Service staff photographer, are: Top row, left to right, Dr. Edward C. Tolman, University of California and his brother, Dr. Richard C. Tolman, National Defense Research Committee; Prof. Ernest O. Lawrence, University of California; President Karl T. Compton, Massachusetts Institute of Technology, and his brother, Prof. Arthur H. Compton, University of Chicago. Center row, Prof. Edwin G. Conklin, President of Science Service; Dr. Harlow Shapley, Harvard College Observatory; Dr. Irving Langmuir, Nobelist, of General Electric Research Laboratory; Dr. Henry N. Russell, Princeton; Prof. George D. Birkhoff, Harvard University; Dr. R. W. Wood, Johns Hopkins University. Bottom: Dr. Frank B. Jewett, president of the National Academy of Sciences; Dr. J. McKeen Cattell, editor of Science; Dr. Henryk Arctowski, Smithsonian Institution; Lt. Paul A. Smith, Coast and Geodetic Survey, Prof. H. D. Curtis, University of Michigan. Shown at top and bottom of page are sections of the Act founding the National Academy of Sciences.

Thirty-
Congress of the United States of America:
At the Third Session,
day of December, one thousand eight hundred and
AN ACT
To incorporate the National Academy of Sciences
Galusha A. Grow
Speaker of the House of Representatives
Solomon Foot,
President of the Senate pro tempore
Approved, March 3, 1863.
A. Lincoln

GEOPHYSICS

Quake Waves Can Measure Rotation of Earth's Core

Would Confirm Theory That Core Is Liquid Under High Pressure, Which Would Lag Behind Outer Layers

DOES the central mass of the earth spin less rapidly on its axis than the outer crust? Earthquake waves may help us find out, suggested Archie Blake, U. S. Coast and Geodetic Survey seismologist, at the meeting of the American Geophysical Union in Washington.

The core of the earth is now regarded by scientists as a liquid under high pressure; a honey-cored golf ball might serve as a rough model. Liquids in a rotating container tend to lag behind the walls that confine them. This can be demonstrated on a small but exaggerated scale by setting a goldfish bowl full of water on an old-fashioned piano stool and giving it a spin. It is possible that the viscous liquid core of the earth may behave in somewhat the same fashion, although the lag would of course be relatively far less, and detectable only by the most delicate instrumental means.

These means would consist of special vertical types of seismographs, able to record the deflection of earthquake waves passing into and out of the lagging liquid earth-core on their way through the earth. Until recently such seismographs have been very costly, hence very few, and these few not particularly advantageously distributed over the earth. Now, however, the cost of good vertical seismographs is less and their number is increasing, so that data may at last be obtained bearing on this rather important question of what goes on deep under our feet.

Science News Letter, May 10, 1941

Low-Cost Seismograph

ONE SUCH vertical seismograph, now under test by workers of the Jesuit Seismological Association, was described before the Geophysical Union by Rev. James B. Macelwane, S. J., of St. Louis University. It is the invention of William Sprengnether, a skilled instrument maker of St. Louis. It has the double advantage of being very sensitive and not costing much.

Essentially, the Sprengnether vertical seismograph consists of a pair of flat coils of copper wire around an iron armature, suspended by a spiral spring and free to move in the field of a powerful alnico magnet. When vertical waves from a distant earthquake cause the suspended coils to jiggle up and down slightly, the magnetic field produces a slight electric current in the coils.

This current, passed through a sensitive galvanometer, causes its mirror to swing back and forth, deflecting a beam of light from a small electric lamp. This dancing light beam writes the record of the earthquake waves on a piece of photographic paper.

Father Macelwane also reviewed the history of earthquake study in this country. Twenty years ago, he said, there was hardly a really first-class seismological observatory in the United States, and very few that would rate in the second class. Now there are a number of stations definitely of the first rank, and a considerably larger number in the second class that are equipped to do effective work. Young men are conducting graduate studies in seismology, not only for the study of earthquakes but for economic application of the technique in such tasks as prospecting for oil and minerals and sounding to find bedrock for bridge and dam foundations.

Science News Letter, May 10, 1941

Measures Water Vapor

A NEW apparatus for measuring air humidity, inexpensive to build and operate, yet accurate in its results, was described before the American Geophysical Union by Dr. C. W. Thornthwaite of the U. S. Soil Conservation Service.

Ordinary hygrometers used for measuring the amount of water vapor in the air (something every weather-man has to know) depend on the stretching and contracting of hair as it becomes moist and dries out. Human hair is commonly employed for this purpose—blonde preferred. But even the best of blonde hair is fickle, and hair hygrometers tend to become inaccurate in a relatively short time.

Better technique is to pump air through some absorbing chemical which will take the water out of it. Increase in the weight of the chemical shows how much water it has taken out of the air. However, methods of this sort have hitherto been both cumbersome and delicate—better adapted for laboratory than for field use.

Dr. Thornthwaite has developed a new device that can be used in the field. It employs an ordinary, good-sized hypodermic syringe as an air pump, driving it with a tiny motor that will run for months on end on a dry-cell battery. The air is pumped through a bent tube containing alumina, which is the intermediate stage between bauxite and aluminum in the manufacture of that important white metal. A sufficiently sensitive chemical balance completes the equipment.

Science News Letter, May 10, 1941

Frequent at Equinoxes

IF YOU want to see a good display of the northern lights—the "aurora borealis"—you are most likely to do so in September and March. In latitudes 45 to 60 degrees, as measured from the earth's magnetic poles and equator, which includes a large part of the United States, such displays occur most frequently at the equinoxes, Dr. C. W. Gartlein, of Cornell University, told the American Geophysical Union meeting.

His studies, made with the assistance of the National Geographic Society, also indicate that the magnetic storms which are often associated with the aurorae, occur most often at these times of year as well.

He said that both the storms and aurorae are subject to a cycle of eleven years, like the spots on the sun, but the peak of the storms and lights comes after that of the spots.

Science News Letter, May 10, 1941

The United States has more miles of *railway* than all South America, Asia, Africa, and Australia together.

At various stages of its life, the Atlantic *salmon* bears the following names: egg, sac fry, advanced fry, fingerling, parr, smolt, grilse, adult salmon and (when dying) kelt.

Replacing white paint, permanent *traffic lines* of yellow vitrified brick are being set into some New York streets.

The British Royal Botanical Gardens at *Kew* have suffered considerable damage from air raids.

NATIONAL SCIENCE FUND

These men seek funds for basic researches in science. Left to right: Dr. William J. Robbins, New York Botanical Garden, Dr. Harlow Shapley, Harvard University astronomer, President Karl T. Compton, of the Massachusetts Institute of Technology, Dr. Frank B. Jewett, president of the National Academy of Sciences and a member of the National Defense Research Committee, Dr. A. F. Blakeslee, Carnegie Institution botanist, and chairman of the National Science Fund committee, Prof. Douglas Johnson, Columbia University geologist and Dr. Robert A. Millikan, California Institute of Technology physicist. Gano Dunn, well known electrical engineer, and Dr. James R. Angell, former Yale President, are on the committee but were not present to be photographed.

GENERAL SCIENCE

National Science Fund To Encourage Basic Research

Will Receive and Administer Gifts for Advancement Of Science; Directed by Scientists and Laymen

SUPPORT for basic researches in science, that may mean as much for future ages as Franklin's experiments in electricity or Pasteur's first discoveries on germ life have meant for the present generation, is to be provided from the National Science Fund, newly instituted under the auspices of the National Academy of Sciences.

Dr. Frank B. Jewett, president of the Academy, in announcing the establishment of the new organization, pointed out that "a single discovery by a research scientist may revolutionize our outlook in an entire field of human behavior," and he further insisted that despite present perversions of research results to the ends of wholesale destruction, the long-run effects of science and technology are greatly to the benefit of the human race.

The purpose of the National Science Fund will be to receive and administer gifts for the advancement of science. The Fund will be directed by a joint board made up of scientists and laymen. Twelve lay members, prominent in non-official public affairs, have been appointed, together with 20 eminent scientists from the membership of the Academy. Dr. William J. Robbins, director of the New York Botanical Garden, has been designated as acting chairman of the board.

Commenting on the new enterprise, Dr. Jewett said:

"One of the important tasks of science today may well be to lay the groundwork for new industrial enterprise to fill the gap after the artificial stimulus of defense orders and the armament business falls off. Unless fundamental research can be carried on now in the university and engineering school laboratories, at a time when industrial organizations are being pushed to meet national defense needs, the basis for the industrial development and production of the next decade may be placed in jeopardy."

The National Science Fund has been organized as the result of a three-year study of the present sources of financial support for fundamental research in science by a committee under the chairmanship of Dr. A. F. Blakeslee, of the Carnegie Institution of Washington, with Howland H. Sargeant as executive director. The study disclosed the urgent necessity for new sources of revenue, to supplement and replace former sources which have become diminished through the depression and other recent rapid economic changes.

Science News Letter, May 10, 1941

RADIO

Radio Waves Travel With Speed of Light

RADIO waves have "practically the velocity of light," a research quartet of West Virginia University has found in a new series of experiments reported to the American Physical Society. The speed is about 186,000 miles per second.

The observations were made by Prof. Robert C. Colwell, H. Atwood, Jr., J. E. Bailey and C. O. Marsh. They set up a transmitter on the campus at Morgantown, which broadcast ten pulses a second, each lasting for a hundred thousandth of a second. This was received by a portable unit which automatically sent a return pulse, in its turn received at the first transmitter. There, both the original and the return signal were shown by a luminous line on a tube like that used in television receivers. This indicated the total time for the round trip. Part of it was due to actual transmission between the stations, the rest was the delay in the radio equipment.

First, readings were taken with the portable station near the fixed one. Then it was moved farther away and more measurements made. Since the instrumental delay was the same in both sets, the difference between the measurements "is the time taken for the radio pulse to travel twice the distance between the two positions of the portable station."

The measured velocity in the line of sight, they stated, came out practically the same as that of light.

Science News Letter, May 10, 1941

MEDICINE

Hormone Banks Ward Off Premature Change of Life

HORMONE banks are coming to the rescue of women facing premature change of life when tumors or other conditions make necessary the surgical removal of both ovaries, it appears from a report by Dr. Udall J. Salmon, Dr. Samuel H. Geist and Dr. Robert I. Walter, of Mount Sinai Hospital, New York City, at the meeting in Atlantic City of the Association for the Study of Internal Secretions.

Pellets of female sex hormone crystals were buried under the skin of 35 women at the time of removal of the ovaries. The hormone pellets or crystals became a bank on which the body could draw for supplies of the sex hormone which would normally be supplied by the ovaries.

The change of life symptoms that follow removal of the ovaries can be delayed in some patients for longer than 22 months and greatly reduced in severity when they do occur as a result of the hormone banks, the New York physicians reported.

Overactivity of the pituitary gland, which may follow removal of the ovaries, can be delayed for three or four months, they stated, and other signs of deficiency of sex hormones can be prevented for upwards of 22 months.

Science News Letter, May 10, 1941

BOTANY

Africa, Not America, Native Land of Watermelon

AFRICA, not America, is the native land of the watermelon, in the judgment of Dr. Orland E. White of the University of Virginia. Speaking before the Virginia Academy of Science in Richmond, he told of recent researches at the Blandy Experimental Farm, which throws new light on the ancestry of this favorite summer fruit.

Watermelons were known at neither the Epicurean feasts of ancient Greece nor the Lucullan banquets of Rome, Dr. White stated. Not until the great age of exploration in the sixteenth century do they appear in the world picture. Dr. White is of the opinion that the Portuguese, pushing southward along the coast of Africa, became acquainted with the ancestors of modern watermelons growing wild in South Africa. They soon transferred them to their colony of Brazil, where the Indians, knowing a good thing when they saw it, promptly adopted them and added them to their own array of crops. Thus the myth of an American origin of watermelons came into being.

Dr. White has obtained seeds of several strains of these small wild South African melons, which have little enough resemblance to the monsters of the modern melon-patch. He also has under cultivation stocks of a bitter variety of melon, known as the colocynth, known to the ancient Egyptians and other Mediterranean peoples but used by them only as medicine. He had made many crossings between them and modern cultivated watermelons, some of which may eventually prove commercially valuable. At present, however, he is more interested in the bearing of his genetic experiments on the question of the watermelon's origins.

Science News Letter, May 10, 1941

MEDICINE

Supply of Physicians May Not Keep Up With Demand

NATIONAL defense demands for physicians may exceed the available supply, according to figures announced by the American Medical Association.

New doctors are being graduated from medical schools in the United States at the rate, on the average, of 5,173 each year. The number has remained fairly constant for the past six years. Physicians licensed to practice medicine for the first time average 6,049 each year. The difference between the two figures is accounted for by licenses to graduates of foreign medical schools.

The defense program demands, in connection with training an army of 1,400,000 men, from 7,000 to 8,000 reserve medical officers for each of the next three or four years.

"Assuming, as it does, that 50 per cent of the reserve medical officers would remain on active duty at the end of each year, there would be in 1944 some 3,000 fewer available than the army would require unless additional recruits are secured for the Medical Officers Reserve Corps," the Journal editor points out.

Whether the supply can keep up with the demand for physicians for civilian and military needs is uncertain, the editor continues. Any lessening of the supply, such as would occur if medical students are taken out of medical school and sent to army training camps, would result in a serious shortage of doctors "with consequent impairment of the health both of the military forces and of the civilian population."

Science News Letter, May 10, 1941

IN SCIENCE

PHYSIOLOGY

Salt Is Preventive Of Gland Deterioration

ORDINARY table salt has been found to be an effective preventive of deterioration of the pituitary, one of the most important of the body's ductless glands, in experiments performed at the University of California by Dr. Alexei Koneff, R. O. Holmes and Dr. J. D. Reese.

Ordinarily, the pituitary undergoes deterioration if the adrenal glands become diseased or are surgically removed. The consequences may be exceedingly serious, for the pituitary influences growth, blood pressure, the normal functioning of the sex glands and of so many other organs that it is sometimes referred to as the "master gland."

The three researchers reported that rats whose adrenals had been removed survived indefinitely in apparently good health and with normal glandular functions if they were given plenty of salt.

Science News Letter, May 10, 1941

MEDICINE

Epilepsy Remedy Causes Decrease in Blood Proteins

DILANTIN, new and successful epilepsy remedy, causes weight loss and decrease in blood proteins in adult patients, Dr. Felix Frisch and Dr. Albert W. Pigett, of Skillman, N. J., have discovered. They announced their findings at the meeting of the American Psychiatric Association in Richmond.

The number of seizures, or fits, was reduced from an average of 13 a month to one a month when the patients were treated with dilantin, they reported. At the same time there was a reduction in body weight from an average of 174 pounds to 153 pounds.

The decrease in proteins in the blood corresponded to the effectiveness of the remedy in reducing the number of epileptic seizures. This loss of blood proteins, it was pointed out, is a "rather unfavorable and by no means indifferent effect which has to be considered and supervised during treatment."

Science News Letter, May 10, 1941

E FIELDS

AERONAUTICS

400-Mile Winds Test Plane Models at Wright Field

See Front Cover

READY to create gales as fast as 400 miles an hour to test models of Uncle Sam's war planes, the giant 40,000 horsepower motor depicted on the cover of this week's SCIENCE NEWS LETTER, is now receiving its final tests in the East Pittsburgh plant of the Westinghouse Electric and Manufacturing Company, where it was built. It will go into service at Wright Field, Dayton, Ohio, where a new wind tunnel is being erected for the Army.

Science News Letter, May 10, 1941

PHYSIOLOGY

Endocrine Gland Chemicals Control Body Development

THE near-magic that chemistry has lately wrought in curing a large group of dangerous germ diseases has distracted the attention of many of us from the equally exciting chemistry by which the glands of internal secretion develop the various parts of our bodies and keep them working in harmony.

The chemicals that do this are called hormones. Their name comes from a Greek word meaning "excite," although since their christening, scientists have discovered that the hormones may repress as well as excite activity. The fascinating story of these almost unbelievably powerful chemicals and the glands that make them is told in a new book, *Endocrinology,* by a scientist who has pioneered in the study of the glands and their functions, Dr. R. G. Hoskins, Harvard Medical School. (*Reviewed, SNL, this issue.*)

"Though secreted in almost infinitesimal amounts," he points out, "the hormones wield a mighty influence. A baby born without thyroid tissue is a misshapen drooling object with protruding tongue and abdomen who never, of his own resources, becomes more than a stunted, bandy-legged imbecile.

"Lack of another hormone from the pituitary gland prevents growth so that the individual remains a diminutive dwarf. An oversupply of the same hormone in childhood leads to gigantism. If the overgrowth begins after puberty, when well-rounded development is no longer possible, excessive tissue formation takes place in such parts of the body as are still able to respond, the result being a gross, misshapen individual who seems to have reverted to a gorilla type.

"An excess of one of the adrenal hormones causes a marked accentuation of the masculine sex traits. In the male this results in an exaggeration of virility. In the female it produces a masculinized caricature, the deep-voiced, coarse-featured bearded lady of the circus side show. In different varieties of dogs similar bodily deviations have become hereditary. The Pekingese is a dwarf, the Great Dane a giant, and the bulldog an acromegalic."

Science News Letter, May 10, 1941

ETHNOLOGY

Remove Rattlers' Fangs Before Hopi Dance

RATTLESNAKES handled with crowd-astonishing familiarity in the famous Hopi Indian snake dance are first rendered harmless by removing their fangs, declares Dr. Charles M. Bogert of the American Museum of Natural History. (*Natural History,* May.)

On a recent trip into the Southwest, Dr. Bogert and a companion witnessed the Hopi ceremonial. When the snakes were released at its conclusion, the two zoologists captured one of them, a thirty-inch rattlesnake. They had to be very careful to avoid the observation of the Indians, who would have been offended at this interference with their religious observance.

Dr. Bogert wrapped the snake in a sack and concealed it in the crown of his hat. At his first opportunity, he examined its jaws, and found that not only the functional fangs, but also the embryo fangs held in reserve to replace them when they are shed, had been skillfully cut away. The poison glands remained, but without the fangs these were harmless.

Dr. Bogert is inclined to believe that the snake-charmers and fakirs of India also remove the fangs of the cobras which they use in their performances. In certain other parts of the world, snakes used in ceremonials are rendered innocuous by either removing the poison glands or having the snake's mouth sewed up so that it cannot strike.

Science News Letter, May 10, 1941

CHEMISTRY

Roman Candles Were First Form of Chemical Warfare

ROMAN candles are not Roman. They are really Chinese, and they were the first form of chemical warfare, Prof. Leonidas R. Littleton of Emory and Henry College told the Virginia Academy of Science meeting in Richmond. They probably had little material effect, but may have had some "scare value." The same was probably true of the later invention of Greek fire, Prof. Littleton suggested, for "there is nothing man fears more than fire, either here or hereafter."

For many centuries, about the only contribution of chemistry to war was the invention of black powder and the improvement of the metal used in firearms. Only since first World War days has the chemist begun to contribute the fearsome armamentarium of blistering and poisonous gases and sprays, unquenchable fires of incendiary bombs, and artificial fogs of concealing smoke.

Despite the importance of chemists' contributions to modern warfare, however, their greatest responsibility will come in the readjustment period after the war, when their skill and knowledge will be needed in the conversion of the great chemical plants and the immense stocks of materials from military to civil purposes. For this reason, Prof. Littleton warned against drafting too many chemists from their normal pursuits.

Science News Letter, May 10, 1941

GENERAL SCIENCE

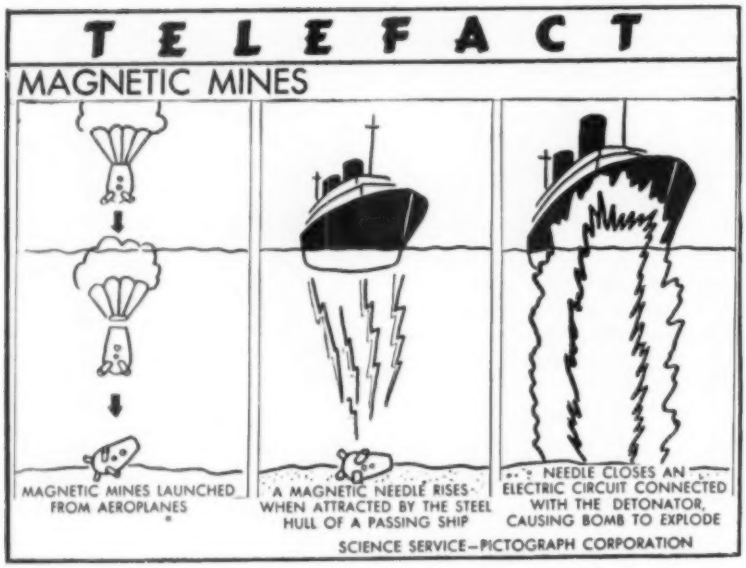
New Organization to Promote Science in South

TO PROMOTE the interests of science in the South, a new Southern Association for the Advancement of Science has been organized. Dr. George D. Palmer of the University of Alabama, who served as president during the organizing period, is now secretary-treasurer. Dr. G. H. Boyd of the University of Georgia is president-elect.

In addition to the encouragement of scientific research in general and its application to problems of the South in particular, the declared objectives of the new Association include the setting up of a roster of Southern research talent available not only for specific Southern problems but for national defense.

Announcement of organization is made in *Science* (April 18) by the organizing secretary, Rev. A. J. Westland, S.J., of Spring Hill College, Mobile, Ala.

Science News Letter, May 10, 1941


TELEFACT
MAGNETIC MINES
MAGNETIC MINES LAUNCHED FROM AEROPLANES
A MAGNETIC NEEDLE RISES WHEN ATTRACTED BY THE STEEL HULL OF A PASSING SHIP
NEEDLE CLOSES AN ELECTRIC CIRCUIT CONNECTED WITH THE DETONATOR, CAUSING BOMB TO EXPLODE
SCIENCE SERVICE—PICTOGRAPH CORPORATION

PSYCHOLOGY

Threat Propaganda Neglects Man's Basic Need to Think

Psychologist Declares Thought May Be Blacked Out Only for a Time by Censorship and Gestapo

PROPAGANDA, censorship, and the threats and over-rosy promises of politicians are based on an underestimation of the desire for honest thinking among the people, Dr. Max Wertheimer, professor of psychology at the New School for Social Research, told psychologists. This thirst for knowledge cannot be permanently blacked out even by Gestapo and concentration camps, he declared.

Widely held theories about how men and women form opinions and attitudes have taught that individuals are influenced most effectively by threats of some menace if they fail to vote or act in the desired way or by promises of protection and a "new order" if they comply.

Such theories fail to take account of the fact that men want to think, Dr. Wertheimer indicated. Speaking at a special meeting of psychologists discussing psychological study of the formation and change of opinions and attitudes, Dr. Wertheimer said:

"The basic assumptions in terms of which the psychology of attitudes is now widely viewed, such as a short-sighted pain-pleasure principle, habit in terms of learning by drill, prestige, and so on, underestimate the role of real thinking in men, the thirst for grasping the situation, for reaching a true orientation, for honestly facing the facts in their structural meaning.

"Those assumptions easily lead to techniques of propaganda in terms of indoctrination, to techniques of promises, threats, intimidations.

"But if one realizes the thirst for thinking, then one sees that the situation calls not for propaganda in these terms but for giving the facts squarely, for clarification that makes possible structural insight.

"Political leaders often do not realize the desire for honest thinking among people or gravely underestimate it. Of course, these thinking tendencies can be blacked out for a time by tricky propaganda, by censorship, concentration camps, Gestapo, and by other highly developed means. But after a time, people will reassert somehow their need for honest facts."

Science News Letter, May 10, 1941

The rare find of a *pearl* in a salt water clam was recently reported by a Connecticut clam digger.

GENERAL SCIENCE

Three Britons Honored by National Academy

HONORS to Britain marked the election of three British subjects as Foreign Associates of the National Academy of Sciences, at the annual meeting of the Academy. Ordinarily these coveted elections, highest honor to foreigners within the gift of the Academy, are distributed among several nations.

The newly elected Foreign Associates are Prof. E. D. Adrian, Cambridge University physiologist; Prof. A. V. Hill, physiologist, secretary of the Royal Society; Sir Arthur Keith, veteran anthropologist and archaeologist, now living in retirement at Down, in Kent.

Fifteen eminent American scientists were elected to membership. The list includes: Prof. W. E. Bachmann, University of Michigan, chemistry; Dr. R. J. Dubos, Rockefeller Institute for Medical Research, bacteriology; Prof. E. A. Graham, Washington University (St. Louis), medicine; Dr. A. S. King, Mount Wilson Observatory, astrophysics; Prof. C. C. Lauritsen, California Institute of Technology, physics; Dr. A. L. Loomis, Loomis Laboratories, Tuxedo Park, N. Y., physics; Prof. J. R. Oppenheimer, University of California, physics; Prof. J. T. Patterson, University of Texas, zoology; Prof. Karl Sax, Harvard University, botany; Dr. G. G. Simpson, American Museum of Natural History, paleontology; Dr. Joseph Slepian, Westinghouse Electric and Manufacturing Company, electrical engineering; Dr. L. F. Small, National Institute of Health, organic chemistry; Dr. W. M. Stanley, Rockefeller Institute for Medical Research, biophysics; Prof. T. Y. Thomas, University of California at Los Angeles, mathematics; Prof. G. B. Wislocki, Harvard University, anatomy.

As new vice president, to hold office during the coming four years, the Academy elected Dr. Isaiah Bowman, geographer, president of the Johns Hopkins University. Dr. S. A. Mitchell of the Leander McCormick Observatory, University of Virginia, and Dr. E. B. Fred of the University of Wisconsin were elected as members of the Council of the Academy.

Science News Letter, May 10, 1941

Some kinds of *asbestos* used in industry are obtained in quantity only in Africa.

Why "telescopic eyed" *goldfish* have poor sight in their very large eyes is being investigated by a biologist at Rensselaer Polytechnic Institute.

ASTRONOMY

Exploding Stars

Once in Five or Six Centuries a Star Will Explode Releasing Energy 100,000,000 Times That of Sun

ONCE in every five or six centuries one of the billions of stars in the Milky Way explodes with an output of energy approximately 100,000,000 times that of the sun.

These explosions represent the most titanic sudden releases of energy that have been observed in the universe. The last to be observed in this star system occurred 369 years ago, and another 200 years may pass before man will see again with the naked eye a bright star shining at noon day.

But the Milky Way is only one among thousands of systems each having billions of stars. In each one of these systems there is such a star explosion about once in every 500 years. Observations of these during the past five years have enabled astronomers of the Mount Wilson Observatory of the Carnegie Institution of Washington and the California Institute of Technology to open up a new chapter in observational astronomy—the astronomy of the most spectacular phenomena in the universe.

More Frequent Type

There is another type of star explosion fairly frequent and well-known, the normal nova, or new star. The stars are normally extremely stable balls of glowing gas. But each year one star in a few thousand million suddenly becomes unstable, swells up and blows off its cover, and then subsides into a state of partial collapse. Within our own galactic system of several thousand million stars, ten or twenty flare up each year to maximum luminosities of about 100,000 times that of the sun and then slowly fade until, years later, they approximate their original brightness. Only a few of these are actually noticed and still fewer are near enough to be conspicuous. Occasionally, when this happens to one of the nearer stars and the outburst is especially bright, the event may be described as spectacular. Five times during the twentieth century we have seen bright, naked-eye novae. They appeared in 1901, 1918, 1920, 1925, and 1934.

But these normal novae explosions, after all, are as fire crackers to big guns when they are compared with the thousand fold greater phenomena of the supernovae which the Mount Wilson astronomers are now studying.

Supernovae outbursts presumably occur in our own star system once in every four or five centuries. It is reasonably certain that none has taken place during the three centuries since telescopes have become available. However, there are at least two earlier records of outbursts which were almost certainly supernovae —in the years A.D. 1572 and 1054.

The supernova of 1572 flared up in the constellation of Cassiopeia to rival the planet Venus in brightness. It was visible in full daylight. The position of the strange object was measured with unusual precision by Tycho Brahe, the Danish astronomer, who startled the world by proving that the new star lay above the moon in the supposedly changeless regions of the heavens. It faded and was lost from sight about eighteen months after its first appearance. Since telescopes were then unknown its subsequent history remains a mystery. The region has been examined carefully with the great telescopes available today. There are many faint stars within the area. Any one of them might represent the final stage of the supernova. It seems likely that, if any remnant of the outburst still survives, it is more than 100,000,000 times fainter than the maximum luminosity during its explosion.

Visible for Months

The only other record is from China. In A.D. 1054, Chinese astronomers observed a new star which remained visible for several months near the star Zeta Tauri. In this general region of the sky is an object known as Messier 1, a mass of gas about one-sixth the apparent diameter of the moon, known as the Crab Nebula. This object is expanding. If the present rate has remained constant the expansion must have started eight or nine centuries ago. The expanding cloud may be the remnant of the ancient supernova. A few years ago a reference to this star was found in an old Japanese chronicle, where it was compared with the planet Jupiter. A few months ago two Dutch Oriental students discovered other records, including a rather detailed account of the outburst in a Chinese history of the Sung dynasty. The position was described in considerable detail and agrees quite well with that of the Crab Nebula.

The spectrum of the gas cloud indicates that the rate of expansion is about 800 miles per second. Its distance is about 5,000 light years. Thus it can be calculated that its maximum luminosity must have been of the general order of that of 300,000,000 suns, very definitely in the class of supernovae.

At the center of the Crab Nebula are two faint stars. One is a yellow star which, because of its proper motion, evidently is not associated with the gas clouds but merely happens to be in the line of sight. The other is so abnormal that it is believed to be what is left of the supernova itself after nine centuries. It is a blue star about 400,000,000 times fainter than at its maximum brightness in 1054. Its present luminosity is just about that of the sun. Its spectrum, somewhat difficult to observe against the bright background of the cloud, appears to be that of a very hot, highly collapsed star, an extreme case of the so-called "white dwarfs."

One in Andromeda

In 1885 a star appeared near the nucleus of the great spiral star system in the constellation of Andromeda which was approximately one-tenth as bright as the system itself. This system undoubtedly contains several billions of stars. It is of the same order of magnitude as the great Milky Way system itself. Calculations by Mount Wilson astronomers now show that this outburst must have reached a maximum brightness approximately 100,000,000 times that of the sun.

This conclusion was reached about 1924. During the next twelve years the probable significance of bright novae was generally recognized but little progress was made in their investigation. The difficulty lay in the extreme rarity of the outbursts and the chance nature of the discoveries. During all this period only one outburst actually was observed in a distant nebula.

A systematic search on a modest scale was started at Mount Wilson in 1929. A watch was begun of the Virgo cluster, a compact group of a few hundred nebu-

lae most of which could be recorded on a single plate. It was seven years before the first outburst occurred. This leisurely progress emphasized the need of a well planned, large scale investigation and this was started in 1936 in collaboration with Professor Zwicky of the California Institute of Technology. An intensive systematic search for bright novae was initiated.

In 1937 Dr. Zwicky made the first of his long list of discoveries. As the novae were discovered, their light curves, distances and spectra were investigated at Mount Wilson. The differences between these bright novae and normal novae were so pronounced that it was apparent quite early that they represented distinct types. Subsequent developments established the validity of the distinction.

Nineteen Since 1937

Since 1885, thirty-seven supernovae have been observed in thirty-three stellar systems. Since 1937, nineteen have been recorded, of which seventeen were discovered by Dr. Zwicky or his assistant. Before this survey the frequency of supernovae could only be surmised from the fact that six outbursts accidentally had been found in the Virgo cluster of about 300 nebulae in thirty-one years. Dr. Zwicky's calculations now show that one can be expected about once every five centuries per average nebula — which checks well with the observed frequency of their appearance in the Milky Way.

Supernovae have appeared in nebulae of all types, and show no pronounced preference for any particular types. This fact may be significant because the types of nebulae presumably represent an evolutional sequence. On this assumption, the instability leading to the outbursts does not seem to be associated with any particular periods in the life history of stellar systems.

Another significant fact is the appearance of supernovae in elliptical nebulae which, in general, do not contain supergiant stars or even the brighter giant stars. This fact seems to dispose of a suggestion once made that normal novae may represent explosions of ordinary stars and supernovae the explosions of supergiants.

The studies to date have enabled Mount Wilson astronomers to divide supernovae into two major groups which differ radically in their spectra, maximum luminosities, and the patterns of their light curves.

The two are thus described by Dr. Edwin Hubble of the Mount Wilson staff: "In Group One the form of the light curves is similar in general to that of normal novae. The stars seem to blaze out a million fold or more within the space of a few days. The average maximum, of the order of 100,000,000 suns, is comparable to the total luminosity of an average stellar system. Following maximum the stars fade rapidly at first. Then, after a few weeks, they fade slowly and steadily, losing about one-third of their light each month.

"An outburst which occurred in August, 1937, in a dwarf stellar system about 3,000,000 light years from the earth, may be described as an example. The supernova blazed out to a maximum of about 600,000,000 suns, nearly 100 times brighter than the nebula itself. This maximum is the brightest definitely recorded. The star faded in the usual manner and was last photographed about two years after its discovery. It was then about a half million times fainter than at the maximum.

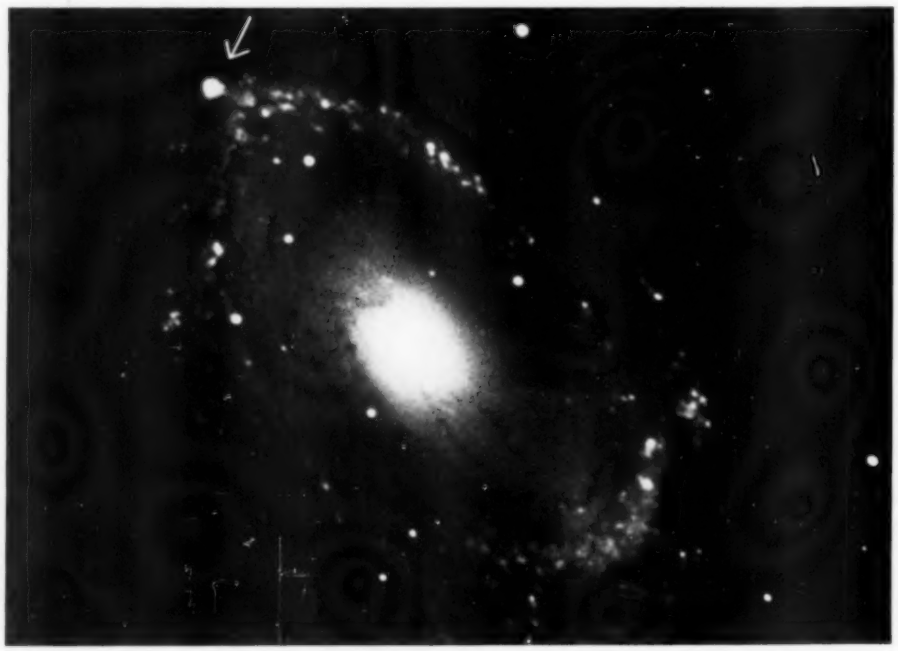
"The amount of energy suddenly released by the explosion is suggested by the fact that the supernova radiated in one day as much photographic energy as the sun has radiated in 1,500,000 years. When the spectra finally are interpreted they evidently will furnish important new information concerning the behavior of matter under extreme conditions far beyond the scope of terrestrial laboratories.

"The spectra are radically different from those of any other known phenomena. Not a single one of the major features has yet been identified. The only recognizable features are two relatively narrow bands in the red which are believed to represent oxygen lines. These bands do not appear until five or six months after maximum.

"Supernovae of Group Two reach a maximum of the order of 10,000,000 suns, and present spectra that resemble those of normal novae on an enhanced scale. A typical example is an outburst that occurred last May in a giant stellar system at a distance of five or six million light years. It blazed up to a maximum of about 30,000,000 suns, or about one-seventh the total luminosity of the nebula. After maximum it began to fade but the rate of fading over the first several weeks was slower than that found for Group One. Later the star faded more rapidly until it reached the usual normal curve, which it followed thereafter.

"The spectrum was recorded from maximum to 76 days after maximum. The first record showed the continuous spectrum of a very hot star. Emission bands appeared four or five days after maximum, as in the case of normal novae, and indicated a velocity of expansion of the order of nearly 4,000 miles a second. All the major features in the photographic region have been identified and the story is reasonably clear. It seems to be the story of a normal nova on a gigantic scale."

Science News Letter, May 10, 1941



SUPERNOVA

The arrow points to a great exploding star in the spiral galaxy NGC 4725—one of the most spectacular phenomena in the universe.

ASTRONOMY

Variable Stars Seen As Stage In Evolution of "Red Giants"

Important Measuring Rods of Universe, the Cepheids, May Themselves Turn Into Stars of an Ordinary Kind

CEPHEID variable stars, which change periodically in light in a characteristic manner, getting bright rapidly and dimming more gradually, may represent a stage in the evolution of another kind of star, called the "red giants," and the Cepheids may themselves turn into a star of an ordinary kind.

This theory was suggested by Dr. Edward Teller, of George Washington University, at a meeting of the American Physical Society devoted to sources of stellar energy. Cepheid stars are important to astronomers as measuring rods of the universe. The brighter they become, the more slowly they change. Thus, when the period of variation of one is found, the astronomer can judge its candlepower. Seeing how bright it looks, he can tell how far away it is.

The red giants are really very diffuse, in the summer constellation of the scorpion, and Betelgeuse, which shines in the winter sky in the figure of Orion. They are many millions of miles in diameter, ten to 100 times as big as the blue stars. The red giants are really very diffuse. If we had a piece of one on earth, we should call it a pretty good vacuum.

Though the reactions in the nuclei of atoms which yield the stellar energy are on an entirely different scale from ordinary chemical reactions, Dr. Teller said that they have the common characteristic that both are speeded with high density and temperature. Thus, more easily reacting nuclei must be present in the red giants, since these stars, in spite of their lower densities and their presumably lower internal temperatures, produce as much energy as ordinary stars.

In ordinary stars, he said, the atoms responsible for energy production are mainly those of carbon and nitrogen. However, he thinks the responsible atoms in the red giants are lighter ones like those of beryllium, lithium, boron and deuterium (or heavy hydrogen). He said that Moses Greenfield, in a paper to be published shortly, discusses the consequences of these reactions in greater detail. Dr. Teller's studies indicate that the main production of energy from these atoms would sometimes not be at the center of such a star, but in a shell a little way out from the center.

If this shell gets sufficiently far away from the center, the star would probably not be stable, but it would start oscillating, as astronomers believe the Cepheids to be doing. So, he concludes, the red giants may become Cepheids in one stage of stellar evolution.

However, after some millions of years, the supply of the light elements would become exhausted, he suggests, and then the Cepheid might become an ordinary, non-variable star.

No H in White Dwarfs

INSIDE the white dwarf stars, like the curious companion of Sirius, the dog star, which is so dense that a cubic inch of its material, though still gaseous, would weigh a ton, no hydrogen is present. So reported Dr. R. E. Marshak, of the University of Rochester. The temperature deep in such stars is about 10,000,000 degrees, he estimates.

It is believed that these dwarf stars are made up mostly of "degenerate" gas. That is, instead of being made of atoms, they consist of swarms of single electrons, which are building blocks of atoms. A great many more electrons can be packed in a given space than atoms, which are many times larger.

In the process by which the stars are normally kept fueled, nuclei of atoms hit each other and hydrogen is transmuted into helium, with carbon, then nitrogen, then carbon over again, and so on, as intermediate stages.

At the high densities of the white dwarfs, if this process were operating, collisions of the nuclei would be much more frequent, and consequently these stars should give off many times as much heat as the sun, yet their output really is considerably less. Dr. Marshak, in explanation, says that there is practically no hydrogen in these stars, except, in a few cases, in an outer shell a few hundred miles thick.

Without hydrogen, he attributes the

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production of energy of the white dwarfs to contraction. That is, the energy released as the outer parts fall to the center is converted into heat. Proposed nearly a century ago, a similar theory was once given in explanation of stellar energy in general, but it was shown that it would not provide energy for the times over which the stars seem to have been in existence. Dr. Marshak says that it would suffice to keep the white dwarfs going for 100,000,000 years at least, and after that they will probably become dark objects.

Dr. H. A. Bethe, of Cornell University, whose theory of the hydrogen-helium transmutation as the source of most stellar energy is now generally accepted, addressed the meeting as well. Dr. George Gamow, of George Washington University, who presided, spoke on his theory that stellar explosions are due to particles called neutrinos, which have no mass.

Science News Letter, May 10, 1941

ARCHAEOLOGY

Takes "1,000-to-1 Chance" Of Finding Oldest Virginians

Smithsonian Scientist Will Explore Remnant of Site Left From Excavation for Four-Lane Skyline Drive

ON a "1,000-to-1 chance" of striking important revelations of the first—literally first—families of Virginia, Dr. Frank H. H. Roberts, Jr., of the Smithsonian Institution, is preparing to make archaeological excavations beside Virginia's famous Skyline Drive near Bedford.

Since discovery there recently of ancient Folsom Man's typical stone dart points, the Virginia Mountain site has been a question-mark spot for popular and scientific interest. Will it, or will it not, reveal as much information about Ice Age Southerners as Dr. Roberts has learned about Ice Age Westerners from digging in the Lindenmeier site, where Folsom Man camped in Colorado, 20,000 years ago?

Possibility that Indian souvenir-hunters of the twelfth or thirteenth century A. D. may unwittingly have given modern science a false steer on Folsom Man's presence at the site is cautiously seen by Dr. Roberts.

"The two Folsom dart points were found in debris of a prehistoric camping ground," he explains. "This may mean that Folsom hunters who reached Virginia camped or worked there 10,000 years, or more, in the past. While Folsom Man's presence in Virginia has been previously detected from such points, they have been found on the surface of the ground. None of his Virginia campgrounds have been examined, which might reveal the sort of food he ate, his other kinds of stone and bone tools, and other evidence of his life in Eastern America. Most important of all would be discovery of skeletal remains, for Folsom Man's appearance is unknown.

"Prehistoric America, however, had its souvenir hunters and antique collectors, and it is possible that the campground was occupied by Virginia Indians of comparatively recent times — recent compared to Folsom Man's era—and one of them may have brought home and kept an old Folsom point.

"In the Southwest, we find traces of Indian collectors frequently. An Indian pot may be unearthed full of odd objects that the owner previously collected and treasured."

To find out which of these solutions is correct, Dr. Roberts will have only a remnant of the original site to explore. Highway excavations for the four-lane Skyline Drive cut through the old site, removing 95% of it. It was during the digging that workmen first observed Indian objects. Dr. David I. Bushnell, Jr., Smithsonian Institution archaeologist called to the site, recognized its significance for American prehistory.

Science News Letter, May 10, 1941

● RADIO

John L. Collyer, president of the B. F. Goodrich Company, and Dr. Howard E. Fritz, manager of the company's synthetic division, will discuss synthetic rubber and rubber-like materials as a means of conserving supplies of imported natural rubber vitally needed for defense as guest scientists on "Adventures in Science," with Watson Davis, director of Science Service, over the coast to coast network of the Columbia Broadcasting System, Thursday, May 15, 3:45 p.m. EDST, 2:45 EST, 1:45 CST, 12:45 MST, 11:45 a.m. PST. Listen in on your local station. Listen in each Thursday.

METALLURGY

Patented Process May Aid Production of Magnesium

THREE new methods for the more rapid purification of magnesium, essential defense metal which, because of its lightness, is used in airplane construction, were revealed in four patents just granted by the U. S. Patent Office. Thomas H. McConica, III, of Midland, Mich., is the principal inventor, though Charles E. Nelson and Thomas Griswold are named in two as co-patentees.

In purifying magnesium from its ores, it is obtained as a vapor, mixed with carbon monoxide, the vapor being condensed to form the solid metal. When first produced, the vapors are hot, and, unless quickly cooled, there is a chemical reaction to form a magnesium compound

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again, which lessens the efficiency of the process.

This is accomplished, in the first of the new methods, by admitting the vapors to a chamber through which is falling finely divided magnesium powder. Each particle acts as a cool nucleus on which the vapor can condense. The mixture of powder and gas is blown through a cooling column, around which cold water circulates.

Then it enters the top of the chamber from which the magnesium powder fell in the first place. The gases are carried away through an exhaust pipe, but the powders are whirled, by the force of the air, around the outer part. Heavier particles drop into a chute which takes them out, but smaller ones fall into a central hopper, ready for another chance to enter the condensation chamber.

The second patent covers a method by which a stream of gas such as helium, hydrogen, or hydrocarbon vapors, is cooled below the freezing point of magnesium (1200 degrees F.), and mixed with the vapors, to cause condensation. In the third and fourth patents the magnesium vapor is condensed by passing it through a bath of another metal which vaporizes at a temperature higher than that at which the magnesium condenses.

The patents are numbered from 2,238,907 to 2,238,910. All four are assigned to the Dow Chemical Company.

Science News Letter, May 10, 1941

MEDICINE

Fat Is Life-and-Death Issue in Diabetes

NEW knowledge of diabetes, showing that in this disease of faulty utilization of sugar, the paramount, life-and-death issue is fat, won for Dr. William C. Stadie, of the University of Pennsylvania, the John Phillips Memorial Medal for 1940-1941 of the American College of Physicians.

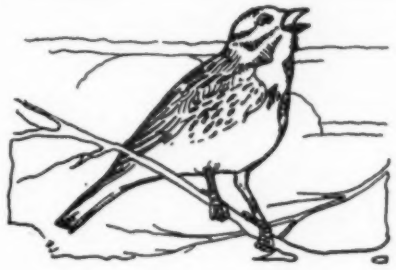
The diabetic, without insulin, is unable to use sugars and so he must fall back on fats for his energy requirements, Dr. Stadie pointed out. He gets part of the energy he needs by burning fat in the muscles themselves. But from one-third to one-half of the energy from fat is obtained by a preliminary burning of fats in the liver, during which substances called ketone bodies are formed.

Regulation of this part of the fat mobilization for energy, however, is limited, so that more ketone bodies may be formed from fat than can be used. If this continues unchecked the dangerous acidosis and coma of diabetes follow.

Science News Letter, May 10, 1941

ORNITHOLOGY

NATURE RAMBLINGS by Frank Thone



How Many Birds?

BIRDS are nesting in every tree—or at least so it seems to the drowsy suburbanite who wants to sleep until half-past seven when the robin outside his window gets other ideas on the subject about half-past four. With three pairs of songbirds nesting anywhere in the same block your dawn-awakened citizen will swear grumblingly that every feathered alarm clock in the country has joined a conspiracy against his slumbers.

How many birds are there in the United States? There are many perfectly serious reasons for wanting to find out, and Roger T. Peterson, of the National Audubon Society, has attempted to make an estimate. After checking over a considerable number of sample counts made during the nesting season, in a few representative habitats, he hazards a guess that "eventually we will find not less than five billion breeding birds in the United States, and probably closer to six billion."

That would average out to about 40 or 50 birds for every human inhabitant—a figure that at first seems astonishingly large, until one visualizes the noisy concentrations of blackbirds that will gather later in the season, or the great "rafts" of ducks that are happily again beginning to be in evidence on some of the new wildfowl refuges.

However, Mr. Peterson declines to call his figure more than a guess. The sample counts are not large enough, or numerous enough, and they leave too many habitat types out of the picture entirely, simply because nobody has ever gone to the trouble of making close counts of the birds in such places as the short-grass plains and mountain heights in the West and the pine barrens and salt marshes of the East.

Bird censuses that have been made with reasonable care show plainly that there is great variation in population density in American bird populations, just as there is in the human population.

The flat, intensively cultivated farmlands of Kansas, for example, show a relatively low bird population—as little as one bird to five acres. Yet in the woodlots and plantings around the farmhouse there are as many as 20 birds to the acre. Eastern woodlands harbor four or five birds to the acre, while neglected farmlands in the same region support only about half that population density.

Bird "cities," like human cities, seem to grow up where there is water. Mr. Peterson estimates that the average bird count on wet lands in the East is not far from nine per acre, and that the concentration in many favorable watery areas is double that figure.

Overclean cultivation of farms and ill-advised drainage of swamps and shallow lakes, in Mr Peterson's opinion, are the greatest causes of devastation in the bird world. Beside them, the small boy with his BB gun (who'll probably miss anyway) is as nothing. He would have farmers keep plows away from weedy, brushy fencerows, and local authorities think long and earnestly before they permit a land speculator to begin the draining of a swamp.

Science News Letter, May 10, 1941

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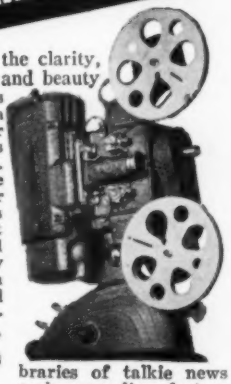

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First Glances at New Books

GENERAL SCIENCE

THE DEVELOPMENT OF THE SCIENCES, 2d series—L. L. Woodruff, ed.—*Yale Univ. Press,* 336 p., $3. The basic sciences from beginnings to more recent times are traced in lectures by eight Yale scientists: Oystein Ore, Frank Schlesinger, Henry Margenau, John Arrend Timm, Chester Ray Longwell, Lorande Loss Woodruff, Walter Richard Miles, and John Farquhar Fulton. These reviews of mathematics, astronomy, chemistry, physics, geology, biology, psychology and medicine are accented upon the historical side without major reference to developments of recent years.

Science News Letter, May 10, 1941

PHYSIOLOGY

ENDOCRINOLOGY, The Glands and Their Functions—R. G. Hoskins—*Norton,* 388 p., $4. See page 297.

Science News Letter, May 10, 1941

ECONOMICS—AGRICULTURE

AMERICAN FARMERS IN THE WORLD CRISIS—Carl T. Schmidt—*Oxford Univ. Press,* 345 p., $3. A careful examination of the American agricultural problem as a part of the great world problem. Most attention is given, of course, to various phases of government aid to agriculture during the past several years.

Science News Letter, May 10, 1941

BIOGRAPHY—HISTORY

LIBERATORS AND HEROES OF SOUTH AMERICA—Marion Lansing—*Page,* 320 p., illus., $2.75. Biographies of 16 men who played leading roles in Western Hemisphere independence, or who stood out so strongly for education and progress in their countries that they are historic figures now. Their careers offer a way of getting better acquainted with neighbors to the South.

Science News Letter, May 10, 1941

MEDICINE

PROBLEMS AND TRENDS IN VIRUS RESEARCH—Thomas M. Rivers and others—75 p., 75c; MEDICAL PROBLEMS OF OLD AGE—Louis I. Dublin and others—46 p., 50c; NUTRITION—Conrad A. Elvehjem, Cyril N. H. Long and Elmer V. McCollum—46 p., 50c; FEMALE SEX HORMONES — Edward A. Doisy and others — 58 p., 50c; HYPERTENSION — Harry Goldblatt and others — 46 p., 50c; CAUSE AND GROWTH OF CANCER—Louis F. Fieser and others—64 p., 75c; DENTAL CARIES—Henry Klein and others—53 p., 50c; PROBLEMS OF INTESTINAL OBSTRUCTION—John P. Peters and others—56 p., 50c; THE RELATION OF DISEASES IN LOWER ANIMALS TO HUMAN WELFARE—John R. Mohler and others—39 p., 50c; MODERN ASPECTS OF THE ANTITUBERCULOSIS PROGRAM—J. Burns Amberson and others—38 p., 50c; CHEMOTHERAPY—E. K. Marshall, Jr. and others—42 p., 50c; THERAPEUTIC ADVANCES IN PSYCHIATRY—Edward A. Strecker and others—35 p., 50c., *Univ. of Penn. Press.*

Science News Letter, May 10, 1941

MATHEMATICS—ENGINEERING

MECHANISM — Stanton E. Winston — *Amer. Tech. Soc.,* 372 p., illus., $3.50. Gears, levers, cams, and other basic mechanisms are fully treated in this book, written in the practical "how to do it" tradition. After new principles are explained, illustrative examples are presented and solved.

Science News Letter, May 10, 1941

CHEMISTRY

A PRACTICAL SURVEY OF CHEMISTRY—Walter S. Dyer—*Holt,* 480 p., illus., $2.80. Intended as a text-book for the student who is not to become a chemist, this excellent work should give him a real background with which he can appreciate the increasingly important work that chemistry is doing. By the same token, it will be of value to anyone who wishes to understand these things.

Science News Letter, May 10, 1941

GEOGRAPHY

UTAH, A Guide to the State—Writers' Program, Utah W.P.A.—*Hastings House,* 595 p., illus., $2.50. Describes scenic marvels, dramatic history, recreation facilities and other features of a state that has vivid personality. Photographs, as in other volumes of this series, are excellent. For the roving motorist, a number of tours are outlined and mapped, with sight-seeing notes and comments for the back-seat driver to enjoy.

Science News Letter, May 10, 1941

HISTORY

THE PLAINS INDIANS AND NEW MEXICO, 1751-1778, A Collection of Documents Illustrative of the History of the Eastern Frontier of New Mexico—Alfred Barnaby Thomas—*Univ. of New Mexico Press,* 232 p., $3.50 (Coronado Cuarto Centennial Publications, 1540-1940, Vol. XI). The worries which beset early settlers and explorers in New Mexico, when Plains tribes harried the area, and horses brought "a disturbing element—mobility" into Plains culture, are described in the introductory essay. The numerous eighteenth century documents which follow have been gathered, many from Spain, some from Mexico, and others from institutions in the United States.

Science News Letter, May 10, 1941

ASTRONOMY

NEW HANDBOOK OF THE HEAVENS—Hubert J. Bernhard, Dorothy A. Bennett and Hugh S. Rice—*Whittlesey House,* 299 p., illus., $2.50. Most elementary books on astronomy are designed to interest the reader in the heavens, but what should he do then? This is the answer. If he has a small telescope, it tells him what to look at, and the significance of what he sees. Perhaps he wants to observe meteors—all right, here are the directions. Double stars, asteroids, astronomical photographs, these are a few of the other topics that the three authors have covered. The book is, by the way, quite different from the original Handbook of the Heavens, which they edited for the Junior Astronomy Club. This is completely rewritten, this time by the members of the trio themselves, and has been greatly enlarged.

Science News Letter, May 10, 1941

SOCIOLOGY

GROWING UP IN THE BLACK BELT; Negro Youth in the Rural South — Charles S. Johnson — *Amer. Coun. on Education,* 360 p., $2.25. A thought-provoking study of serious sociological problems that exist among Negroes in the Southern countryside, prepared for the American Youth Commission. Prof. Johnson describes almost unbelievable poverty, lack of educational opportunity, hopelessness of advancing in vocational fields. How Negro youth reacts to its troubles in life is the question which this research volume endeavors to answer.

Science News Letter, May 10, 1941

CHEMISTRY

CHEMICAL WARFARE—Curt Wachtel—*Chemical Pub. Co.,* 312 p., $4. Dr. Wachtel was in charge of important research work on the use of gas, in Germany during the first World War, and was closely associated with Fritz Haber. In this interesting book he tells of experiences at that time, and also of the results of later studies. It covers such points as Psychological, Social and Economic Aspects; How to Develop a New Gas; Toxicity Figures and Standards; Treatment and Protection; etc.

Science News Letter, May 10, 1941